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THE UNIQUENESS OF THE INDIVIDUAL.

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THE ETHICS OF STUDENT-COMPUTER INTERACTIVE SYSTEMS IN GUIDANCE AND COUNSELING WERE INVESTIGATED. MAJOR TERMS EMPLOYED IN THE DISCUSSION ARE OPERATIONALLY DEFINED. THE ADVANTAGES OF THE COMPUTER-HUMAN RELATIONSHIP AS COMPARED TO THE HUMAN-HUMAN RELATIONSHIP ARE--(1) THE HIGH SPEED COMPUTER IS CAPABLE OF MORE RAPID AND EFFICIENT SEARCHING AND PROCESSING OF USEFUL INFORMATION, (2) NOISE CONTROL AND PRECISION PROGRAMMING RESULT IN MORE ACCURATE TRANSMISSION OF USEFUL INFORMATION, (3) THE SIMPLICITY OF THE COMPUTER SYSTEM FACILITATES NOISE-FREE COMMUNICATION, (4) COMPUTER-GENERATED COMMUNICATION SYSTEMS ARE LESS INTERRUPTED BY NOISE FACTORS, AND (5) COMPUTER-HUMAN SYSTEMS, BECAUSE OF THE RELATIVE SIMPLICITY OF ONE ELEMENT OF THE SYSTEM, REDUCE THE COMPLEXITY OF THE INTERACTION AND RESULT IN LESS NOISE IN THE WHOLE COMMUNICATIVE PROCESS. THE COMPUTER-BASED COUNSELING SYSTEM WOULD FREE THE COUNSELOR FROM FUNCTIONS DEPENDENT UPON INFORMATION GATHERING, DATA ANALYSIS, AND REPORTING. THE COUNSELOR CAN THEN CONCENTRATE ON STUDENTS WITH EMOTIONAL AND PSYCHOLOGICAL PROBLEMS. THE COMPUTER-BASED SYSTEM CAN IMPROVE DATA PROCESSING, WOULD PROTECT THE COUNSELEE FROM AN INVASION OF HIS PRIVACY, AND CAN HELP THE STUDENT IN THE DECISION-MAKING PROCESS. FUTURE APPLICATIONS OF COMPUTER-BASED SYSTEMS ARE DISCUSSED. THIS SPEECH WAS PRESENTED AT THE ANNUAL MEETING OF THE AMERICAN EDUCATIONAL RESEARCH ASSOCIATION, CHICAGO, ILLINOIS, FEBRUARY 1968. (PS)

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Happy are they whom privacy makes innocent, who deal so with men in this world that they are not afraid to meet them in the next, who, when they die, make no commotion among the dead.

Sir Thomas Browne

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Chicago, Illinois

ETHICAL CONSIDERATIONS OF RESEARCH, DEVELOPMENT, AND APPLICATION OF STUDENT-COMPUTER INTERACTIVE SYSTEMS IN GUIDANCE AND COUNSELING

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The general topic under consideration is the ethical considerations of research, development, and implementation of student-computer interactive systems in guidance and counseling. The specific concern is the relationship of these considerations to the sanctity of the natural right of man to be unique.

Since "creation" man has witnessed the founding of continents, discovery of islands, crossing of seas, and conquest of many frontiers of knowledge. These many accomplishments have only served to make him increasingly curious about the world in which he lives, and more cognizant of his inability to completely understand himself and his fellow man.

Great thinkers, philosophers, and scientists have been studying the phenomena of human differences for centuries. Such men as Plato, Socrates, Descartes, James, Adler, Freud, and many others have taken a turn at extricating the uniqueness of man. Men are still wrestling the problems associated with self understanding and human uniqueness. They will probably continue to do so for many centuries to come.

With the advent of high-speed computers and a twentieth century explosion of knowledge, man has gradually found himself capable of employing a plethora of new and powerful tools in the behavioral sciences. These tools have had a significant and probably lasting impact on man's ability to access large bodies of data and to utilize the same more proficiently.

In accordance with present day notions about what constitutes a good scientific practice, the writer will attempt to state the basic problem, generate a set of hypotheses, verify some postulates, and establish a theoretical rationale to undergird a set of logical conclusions. Some sort of theory is implicit in any discussion that involves the nature of man.

The Problem

If a high-speed computer system were successfully employed as a substitute for the counselor in a counseling relationship with a human organism would the practice be ethical?

Prior to stating a set of hypotheses and postulates it is necessary to consider what the writer will mean when certain words or terms are employed in this paper. Hopefully, clarity of communication and understanding will be facilitated by this procedure.

Operational Definitions

1. *Student-Computer Interactive System* - is a system whereby the student is online with a computer via some type of terminal device. Both student and

computer can query each other with the student retaining the ultimate decision choice.

2. *The Counseling Relationship* - is the interaction process whereby the counselor attempts to assist an individual to utilize his own resources and his environmental opportunities in the process of self-understanding, planning, decision-making, and coping with problems relative to his developmental needs and to his vocational and educational activities.

3. *Ethics* - is reason looking at actions and their effects upon life. It encompasses morality which is custom, tradition, and habit looking at actions and their effects upon life. The ethics here used involves both "action" and "rule."

   Action ethics involves the process of gathering information and deciding the best thing to do without reference to the rules. Rule ethics at its best is a summarization of guidelines dealing with classes of actions and their probable effects upon life. The extent to which rule ethics remain in dialog with action ethics, they can be constantly revised to remain relevant to the ever changing conditions of life. If rules remain static they become irrelevant to the extent that conditions for actualizing the good life themselves change.

4. *Man* - is a complex multi-demensional living organism. He is characterized by an infinite number of interlocking variables that constitute a natural phenomena of life.

5. *The Computer* - is a man-made machine. Its behavior is limited only by its power source and by the simplicity of man's intellect.

6. *Noise-factor* - is any factor that inhibits communication or the efficient transmission and reception of communication signals.

Anything that behaves or does things can be described as a machine. The computer unlike man, is a non-purposive machine whereas man is a multi-dimensionally complex living organism (purposive-machine). Each of these dimensions constitute a fundamental building

block and is the site of a fantastically complex set of multiple-chain chemical reactions. These reactions are exquisitely sychronized and coordinated with one another.

The characteristics of man and machine are in many ways similar. Thus, it is imperative that any discussion of the ethical considerations be focussed upon the issue of complexity versus simplicity of the agents involved in the interaction. When interacting in a counseling relationship the participants confront a multiplexity of meaning-variance between the transmitter and the receiver of the communication signals. This variance obviously is a result of numerous compound noise-factors entering uncontrolled into the communicative process. When this noise reaches a certain intensity, interuption in the process occurs, clarity of communication breaks down, and the counseling relationship becomes seriously inhibited.

For adequate communication to be realized each of the participants in the interaction must possess a minimum of five basic characteristics. These include (1) a source of power, (2) a signal receiver, (3) storage capabilities, (4) an information processor, and (5) a signal transmitter. For interaction to take place information must be exchanged between two or more animate or inanimate organisms. This process is enhanced when the noise intensity is carefully controlled.

One point should already be clear about the ethics of employing a machine in a counseling relationship with a human

organism. Man cannot afford to settle for a static code of rules, however elaborate or ingenious, when such a code restricts his ability to expedite human understanding. One of the prime requisites for human liberation and happiness is that each individual should be able to progress and become ever more versatile and adaptable in meeting every situation that confronts him in his efforts to become a self-sustaining and productive member of society.

Probably the greatest problem facing man today and will be for years to come, is that associated with raising the level of human capabilities for survival in a complex social world. The introduction of useful information into our evolving minds to spark the ignition of human drive for progress, self-understanding, and productivity, is an activity that must somehow be promoted. Interestingly enough, one of the factors if not the most important and sacred in such a process of ignition, is man's capacity for furthering another man's drive through the process of creative communication.

Present human counseling systems do not provide for adequate access of various data required for the formulation of "intelligent" human decisions. Even if present human systems could access sufficient data man is incapable of the rapid processing necessary to reduce data into a meaningful or usable form.

Nobody can deny that both man and machine possess the five basic characteristics mentioned earlier. The problem however, is

related to such factors as speed in processing, accuracy, bias, emotions, and a host of other factors that limit man in his ability to operate a noise free interaction system with his fellow man.

Hypotheses

Ho:1 A high-speed computer can be successfully employed as a substitute for the counselor in a counseling relationship with a human organism.

Ho:2 A significant reduction in the intensity of noise in the communicative process between points of transmission and reception will facilitate human understanding, self-realization, and enhance the counseling relationship.

Ho:3 Employment of a student-computer interactive system will result in a noise intensity reduction in the communicative process between points of transmission and reception.

Undergirding these hypotheses is the awareness that open access to information and accurate processing are prerequisite to wise predictions without which no ethical or moral decisions can be adequate. The success of the counseling relationship is largely dependent upon the adequacy of those decisions that are expedited as a result of the relationship.

How can the counselor best expedite this relationship? According to current theory, the efficient expedition of a counseling relationship and the raising of human capabilities is dependent upon the transmission of adequate amounts of useful information to facilitate the human-decisions process. The success of this process is best measured in terms of the adequacy of the decision choices made.

How can this transmission of adequate amounts of useful information be achieved? In attempting to answer this question let us take a look at a set of postulates relevant to communication, the counseling process, and a comparative analysis of human-machine and human-human interaction systems.

Po:1 Useful information is basic to providing adequate guidance and counseling services.

Po:2 Useful information can only be transmitted accurately through adequate communication systems and processes.

Po:3 Adequate communication systems are free of noise.

Po:4 A reduction of noise in the communicative process will enhance the communication system.

Po:5 Human-machine interaction systems contain only one set of unknown behavior dimensions whereas human-human systems contain two or more unknown sets of behavior dimensions.

Po:6 Human-human interaction systems are extremely complex.

Po:7 Human-machine interaction systems possess the characteristics whereby one set of the behavior dimensions can be controlled.

Now let us enlarge upon the basic issue mentioned earlier. The issue is *complexity* versus *simplicity* of the *agents* involved in the interaction. The agents in this instance are the *counselor* and the *counselee*.

We have already established that a human counseling system involves two or more human organisms. These individuals are extremely complex and somewhat unpredictable (*See Figure 1*). In other words,

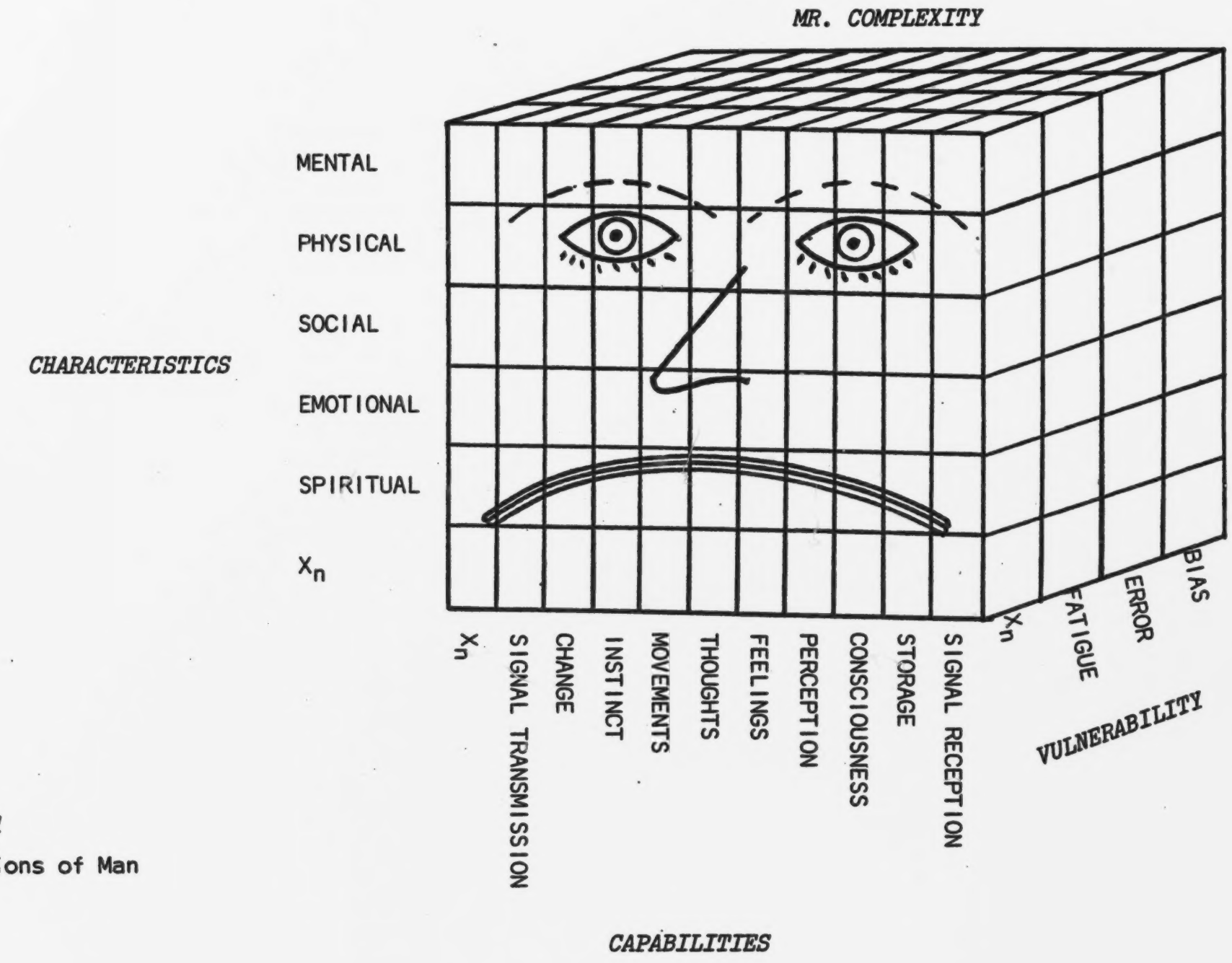

Figure 1

Three Dimensions of Man

human beings are made up of varied and versatile potential. Unfortunately, because of human vulnerabilities man has never been able to fully capitalize upon this potential.

The human nervous system contains upwards toward ten thousand million nerve cells. Even the largest of giant computers only possess parts numbering by comparable count less than a million. Obviously, human beings use only a fraction of their brain potential for productive purposes. It is doubtful that such a profound claim can be attached to the computer.

The computer is a machine into which messages can be fed (*the input or signal receiving components*), and out of which come messages (*the output or signal transmitting components*) which constitute a form of visable performance and behavior. The computer system is probably best described in this instance as an organized relationship between input and output.

Computers like human beings, do not work without a supply of energy or power. However, in the computer this supply of power is controlled and constant whereas in the human organism the brain is powered by an extremely complex system which is vulnerable to fluctuations caused by a multitude of physical, chemical, sensory, and psychosocial variables intervening in the power transmitting components of the system.

Let us consider comparatively the communicative process of the computer and the human organism. The input to a machine is fed into it under a set of precisely controlled conditions. This

input is concentrated at various points in a similar way as in the human. In the human the sensory nerves enter the brain in a most complex variety of ways. In the computer system output is transmitted in a coherent way at certain points, just as the human brain transmits via the motor nerves to the muscles.

The internal components of the computer constitute a complex of interconnected parts between input and output. The complexity of the computer depends upon the number of components included in the nomenclature of the system. In an extremely complex system such as the human organism, one might expect an unimaginably large number of interconnecting components to be found.

When a living organism is compared with a man-machine system, the simplest of living organisms are found to be a great deal more complex. Even bacterial cells are vastly more complex than a giant computing system. In fact, the human organism is so complex that man has not yet been able to develop a realistic way of estimating the complexity. How can men be expected to understand their fellow man when they continue to remain so ignorant about themselves?

Theoretical Rationale

Before a rationale is adequate it should meet certain basic specifications. In lieu of experimental findings, it should be predicated upon fact and logic. To become useful, man must be

willing to accept the theoretical constructs upon which the rationale is founded.

The concern here is with the development of a theoretical rationale based upon postulation of fact and logic. Experimental testing is yet to be accomplished as the system under discussion has not, as yet, been successfully implemented. Therefore, the rationale to be established must of necessity be based upon deductive logic. To accomplish this it will be necessary to restate the original postulates (*Major Premises*), state a set of *Minor Premises*, from which to draw a set of *Logical Conclusions*.

Conclusions

Postulate:1 Useful information is basic to providing adequate guidance and counseling services.

Premise:1 The high-speed computer is capable of rapid random access, precision processing, and efficient transmission of useful information via a terminal device.

Conclusion:1 The high-speed computer can be programmed to transmit useful information to the counselee in lieu of a counselor.

Postulate:2 Useful information can only be transmitted accurately through the use of adequate communication systems and processes.

Premise:2 The computer is extremely accurate in the communicative process because of noise control and precision programming.

Conclusion:2 Useful information can be transmitted accurately, swiftly, and efficiently through the use of a high-speed computer system.

Postulate:3 Adequate communication systems are free of noise.

Premise:3 A computer system possesses a constant flow of power, numerous controls, and fewer internal components than man. Thus, it is more adequate, less complex and vulnerable, as an agent of interaction in the communicative process.

Conclusion:3 The computer is an adequate system for the facilitation of noise free communication.

Postulate:4 A reduction of noise in the communicative process will enhance the communication system.

Premise:4 The computer possesses the advantage of controlled input and output, precision processing, and is less vulnerable to noise than human organisms. Therefore, noise intensity is reduced in communication by employing a less complex agent in the process.

Conclusion:4 Computer generated communication systems possess the advantage of being interrupted less by noise than human communication systems.

Postulate:5 Human-machine interaction systems contain only one set of unknown behavior dimensions whereas human-human systems contain two or more unknown sets of behavior dimensions.

Premise:5 Machine behavior dimensions are known and programmed in advance of interaction. Therefore, Human-machine systems contain one unknown and one known. Human behavior dimensions are unpredictable, unique, and unknown prior to the behavior. Thus, Human-human systems contain two or more unknowns.

Conclusion:5 Human-machine interaction systems are less complex than human-human systems. The complex nature of human-human systems results in being more vulnerable to noise and serious inhibition of the communicative process.

Postulate:6 Human-human interaction systems are extremely complex.

Premise:6 Increased complexity of the agents of interaction will result in an increased level of noise intensity in the communicative process.

Conclusion:6 Communication is enhanced by reducing the complexity of the agents involved in the interaction.

Postulate:7 Human-machine interaction systems possess the characteristics whereby one set of behavioral dimensions can be controlled.

Premise:7 Noise intensity is reduced in the communicative process by controlling the behavior dimensions of the interacting agents.

Conclusion:7 Human-machine systems confront less noise in the communicative process.

Discussion

Conclusions derived directly from a set of "facts" are in reality an estimate of the true facts, generated from a synthesis of as many clues as are available to the estimator. However, when deduction rather than induction is used to derive logical conclusions, the true facts are estimates only to the extent that postulation and minor premises fail to be founded upon fact.

The question now arises as to whether the major and minor premises have been dealt with systematically and logically enough to adequately support the conclusions. Based upon available facts, logical deduction, and present counseling theory, it seems that a high-speed computer if successfully employed in lieu of the counselor, would be a desirable tool in providing adequate guidance and counseling services.

It seems logical to conclude that a reduction of the complexity of one agent (*See figure 2*) in the interaction would improve the communicative process. Hopefully, such improvement would help to expedite the flow of useful information which is basic to a good guidance and counseling relationship.

Supplying the counselee with useful information to help him make "intelligent" decisions, is presently accepted as one of the

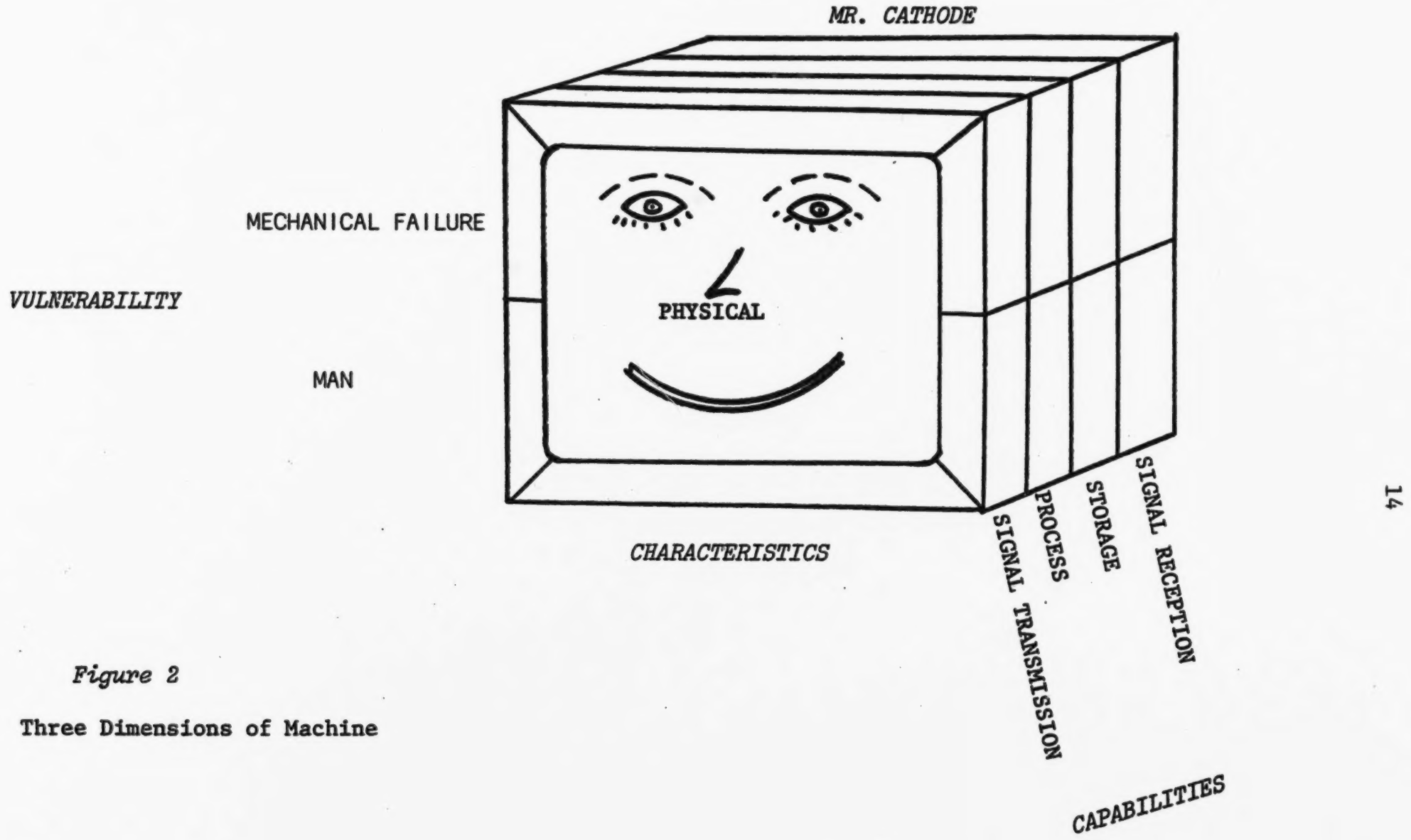

Figure 2

Three Dimensions of Machine

primary purposes of providing guidance and counseling service. The practice has long been accepted as ethical in so much as it is both logical and practical. The real question related to ethics is whether or not the system gets the job done.

Now let us consider the probable consequences of employing the computer as an agent of interaction. First, the successful employment of such a system could be expected to reduce the workload of the counselor relevant to those functions dependent upon information gathering, data analysis, and reporting. This reduction should result in additional time becoming available for counselors and guidance personnel to deal with serious emotional and psychological problems.

Second, it seems reasonable to assume that such a system would improve the processing of data, provide a way to overcome human vulnerabilities, and reduce the inhibiting effects of noise upon communicative precision between the counselor and counselee. Third, such a system would protect the counselee from an invasion of privacy and the invalidation of confidence by those counselors, et al. who would voluntarily or involuntarily prostitute the profession.

Fourth, it is obvious that such a system would speed up access and analysis, as well as increase the capabilities to handle large bodies of data in the decision making process. Such capability should help the counselee to strengthen his self-understanding, decision choices, and to increase his chances of emerging as a self-sustaining, productive member of society.

If ethics is a valid issue when one considers the change that should be generated by employing such a system, the issue is one of "rule" standing in the way of man's natural right to be unique. The world has always been changing. However, the rate of change, and man's commitment to the highest possible rate, are entirely new. The facts of the world in their sensible diversity are always before men, but man's theoretic need is that they should be conceived in a way that reduces their manifoldness to simplicity.

The question of whether or not it is theoretically possible to build a machine system which could respond to any situation with conclusions based on feelings, emotions, perception, biases, and intuition, still remains to be answered. Presently, there are studies under way in connection with the theory of ultra-complex information processing. These studies may in time reveal the fundamental nature of intellectual response is such that man can achieve this task.

The problems associated with building a computerized system with the capabilities of thinking like man are very complex and will probably not be solved in the near future. This raises still another question. Does man really want to build a computer system that appears to think like man? The fact that man is unique in so much as he decides different things in the same situations at different times should be sufficient evidence to thwart the logic of such a notion.

Would the synthetic reproduction of a multi-dimensionally complex human organism help man to better understand himself or

his fellow man? Would it be of value to simulate or synthetically extract the behavior of an organism containing approximately 15 billion neurons of which 10 billion must be relegated to the "brain proper" before it can function properly? From a scientific standpoint the search for answers to these questions is the most exciting aspect of the whole venture.

Despite some soul searching and uncertainty, there is increasing evidence that electronic simulation and synthetic replication of human capabilities offers an infinite potential for making man's life more fruitful. The real challenge to educational researchers today is not merely one of innovation, experimentation, and development, but one of overcoming the constraints of tradition and resistance to change.

This paper can probably best be concluded by paraphrasing the immortal words of Loren Eiseley: "Through how many dimensions and how many media will man have to pass? Down how many roads must man propel himself in search of the answers he is seeking? The journey is difficult, immense, at times blocked by tradition and ignorance, yet that will not deter some from attempting to find the answers. Man cannot possibly know all that has happened in the past, any more than he can with surety discern what lies ahead. Many have joined the caravan, some will travel as far as they can, but few if any will see in one life time all they hunger to know." If man can only retrain himself to capitalize on the new tools of automation, he may yet unravel the mysteries of the greatest "creation" of all times.

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